inexorable strain building processes have not yet revealed themselves again in such a gigantic way. But the trouble is that every earthquake produces different large-scale local effects and the intensive study of one earthquake may be of no value in terms of prevention and cure for the mishaps of the next one. Even two major earthquakes situated in the same region may wreak disaster in totally different ways. In reading this book, therefore, I think one must ask not so much "is it interesting ?" as, "what does it teach us within the terms of President Johnson's request to the scientific community ?". This was a request to assemble a comprehensive account of the earthquake and its effects so as to enable scientists to investigate predictive possibilities and cope with the after-effects.

Much of the book has been previously published in journals and professional papers, and I found it fascinating. The amount of detail recorded about glaciers, water levels, snowslides and aquifers is overwhelming. One can learn that seventeen out of twenty-five wells in Luzon recorded water level fluctuations of 1 to 15 cm. One can look at a multitude of aerial photographs of glaciers in Alaska. But intriguing as all this is, the hydrological consequences to mankind are difficult to abstract in the way that President Johnson would have wanted. True, Robert Goldthwaite in his conclusions tries to draw together from the diversity of data a compendium of hydrologic hazards. His conclusions, as he himself admits, are in the "what might have been" category, as the location of the earthquake was fortunate in terms of hydrological dangers. Accordingly, some of the recommendations seem obvious and of insufficient impact to cause a stir. No rational person builds his house or road in the vicinity of a prospective avalanche or rockslide nor near the shores of inland lakes liable to seiche—but thousands are built there nevertheless and it will need more than this report to stop them. The argument "it won't happen here" is unfortunately 99 per cent true and the hazards are so unpredictable that many will ignore them. Perhaps the most valuable contribution is the recommendation of the continual monitoring of well levels, surface water changes and lake tilts as possible earthquake predictors. These are long term programmes but ones in which hydrology could play a major part.

D. Davies

STRANGE SIGHTINGS

In the Wake of the Sea-Serpents

By Bernard Heuvelmans. Translated from the French by Richard Garnett. Pp. 645+75 plates. (Hart-Davis: London, 1968.) 84*s*.

Reports of monstrous sea serpents have something in common with alleged sightings of unidentified flying objects; both tend to split their audience into two distinct camps—the credulous or open-minded, and the incredulous, some, including Bernard Heuvelmans, would say blinkered, sceptics. Of course, the existence of sea serpents is inherently more probable than the existence of unidentified flying objects and nobody can assert that all the fauna, even all the large animals of the oceans, have been recorded. On the other hand, it is hard to take seriously Heuvelmans's conclusion that there are nine different types of large marine animal which can be included in the general category of sea serpents and which have yet to be captured and examined at close quarters.

In the Wake of the Sea-Serpents is the English translation and abridgment of *Le Grand Serpent-de-Mer* which was originally published in 1965. For good measure, a very much condensed version of another of Heuvelmans's books, *Le Kraken et le Poulpe Colossal* (1958), has been added as the second chapter of the translation. This describes how the fearful Kraken of Scandinavian legend was identified as a species of giant squid, and it serves to put the reader in a receptive frame of mind for what follows—a discussion of almost every report of sea serpents since 1639. One by one the author analyses 587 reports and their claims to serious attention, and as he dismisses 238 reports as hoaxes, mistakes, or simply vague and therefore doubtful sightings, Heuvelmans begins to build up confidence in the notion that there must be something behind those reports which pass muster.

All this makes interesting reading, full of amusing anecdotes, but in the final chapter, "Disentangled and Classified at Last", the author destroys the reader's confidence by grossly overstating his case. As the title of this chapter implies, he claims to classify and give anatomical and ecological details of nine types of unknown sea animals: the long-necked, the merhorse, the many-humped, the many-finned, the super-otter, the super-eel, the marine saurian, the father-of-all-turtles, and the yellow-belly.

As an example, Heuvelmans says the long-necked sea animal, which according to his evidence is the most frequently sighted of them all, is cigar-shaped or serpentine, and much bigger than the largest pinniped. He goes on to say that "the relatively small head is round in shape with a somewhat tapering muzzle, sometimes like that of a seal or dog, sometimes like that of a horse, camel or giraffe". Lest readers begin to think the creature is all things to all observers, he adds, "this apparent contradiction in testimony is doubtless due to the head lengthening with age, as is the rule among mammals". Apparently, the creature has poor eyesight and, "considering the murkiness of the waters it sometimes frequents—for instance Loch Ness—it must hunt its prey chiefly by sonar, as all pinnipeds seem to do". Blithe acceptance of the Loch Ness monster gives the game away of course. Nowhere in the book does Heuvelmans discuss the fact that the Loch was glaciated at the time that it might have been colonized by a sea serpent.

Heuvelmans accepts 82 sightings of the most frequently sighted sea serpents. His descriptions of the less commonly observed types are perforce even more general and even less convincing. Heuvelmans would have better served his cause if, like the encyclopaedia he quotes in his first chapter, he had contented himself with saying: "there is still a residuum sufficient to prevent modern zoologists from denying the possibility that some such creature may after all exist".

The recent reports of a 35-ton sea creature washed up on a Mexican beach (see, for example, the London *Times*, March 7) are more grist for Heuvelmans's mill. The creature is described as being serpent-like, with a body covered in hard jointed armour and a 10 foot tusk projecting from its head, but as with several similar episodes described by Heuvelmans the body is said to be in a poor state of preservation, so whether it will prove Heuvelmans's case remains to be seen.

Note added in proof. Since this review went to press, the Mexican monster, like so many of its predecessors, has been identified as a whale (London *Times*, March 17).

J. Tooze

PLANT CHIMAERAS

Plant Chimeras

By W. Neilson-Jones. Second edition. (Methuen's Monographs on Biological Subjects.) Pp. viii+123. (Methuen: London, January 1969.) 25*s*.

The first edition of *Plant Chimeras*, published thirty-five years ago, was a landmark in the understanding of this fascinating subject. In this new edition, the author has clearly set out to write a readable book, and in order to achieve this aim he has been fairly selective in his choice of references. Nevertheless, only a quarter of the 134

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